



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

**Released Items
Support Materials
2009**

**Grade 11
Science**

**NECAP 2009 RELEASED ITEMS
GRADE 11 SCIENCE**

Grade 11 Science Released Item Information

Item Number	Big Idea ¹	Assessment Target	Depth of Knowledge Code	Item Type ²	Answer Key	Total Possible Points
1	POC	PS 1-3	2	MC	B	1
2	SAE	PS 2-6	2	MC	C	1
3	POC	PS 3-9	2	MC	C	1
4	POC	ESS 1-1	2	MC	A	1
5	POC	ESS 1-4	2	MC	C	1
6	NOS	ESS 3-8	1	MC	B	1
7	SAE	LS 2-3	2	MC	C	1
8	NOS	LS 2-5	3	MC	B	1
9	SAE	LS 4-10	2	MC	C	1
10	POC	LS 3-8	2	CR		4

Grade 11 Science Released Inquiry Task Information

Item Number	Big Idea ¹	Inquiry Construct	Depth of Knowledge Code	Item Type ²	Total Possible Points
1	INQ	1	3	SA	2
2	INQ	8	2	CR	3
3	INQ	11	2	SA	2
4	INQ	11	2	SA	2
5	INQ	11	2	SA	2
6	INQ	12	3	SA	2
7	INQ	10	2	SA	2
8	INQ	12	3	CR	3

¹Big Idea: NOS = Nature of Science, SAE = Systems and Energy, MAS = Models and Scale,
POC = Patterns of Change, FAF = Form and Function, INQ = Scientific Inquiry

²Item Type: MC = Multiple Choice, CR = Constructed Response, SA = Short Answer

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PS1 (9–11) POC-3 Explain how properties of elements and the location of elements on the periodic table are related.

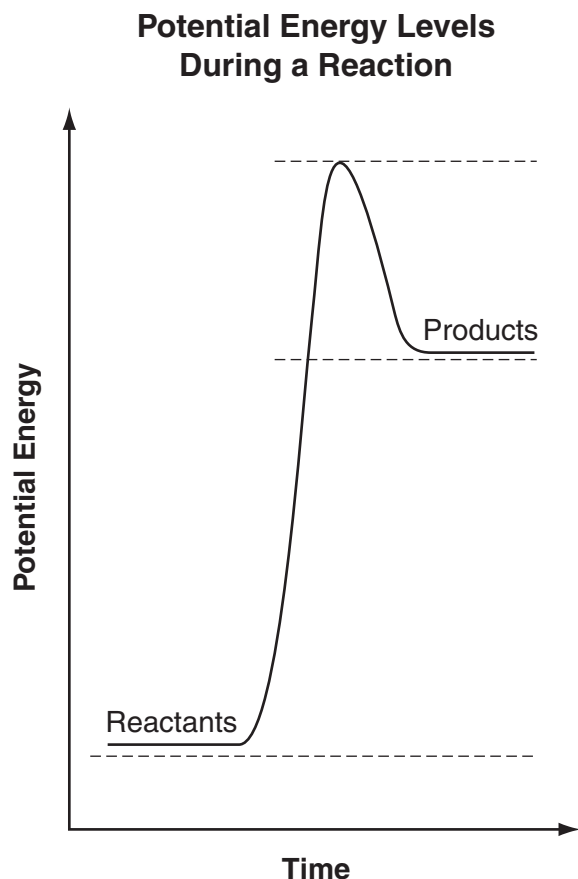
Please use the periodic table on the reference sheet to answer the question.

- ❶ Which chemical property places neon (Ne) and argon (Ar) in the same group?
- A. Both elements form ionic compounds.
 - B. Both elements have a full outer energy level.
 - C. Both elements have low ionization energy.
 - D. Both elements are liquids at 38°C.

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PS2 (9–11) SAE-6 Using information provided about chemical changes, draw conclusions about and explain the energy flow in a given chemical reaction (e.g., exothermic reactions, endothermic reactions).

- 2 The graph below shows the potential energy levels of products and reactants during a reaction.



Which statement **best** describes the reaction shown in the graph?

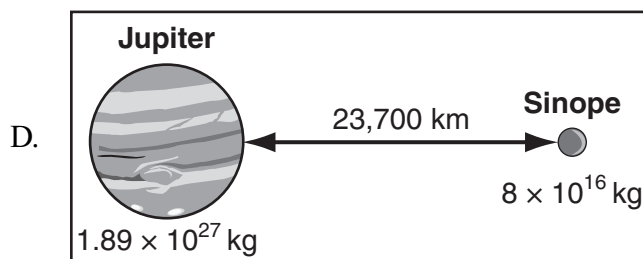
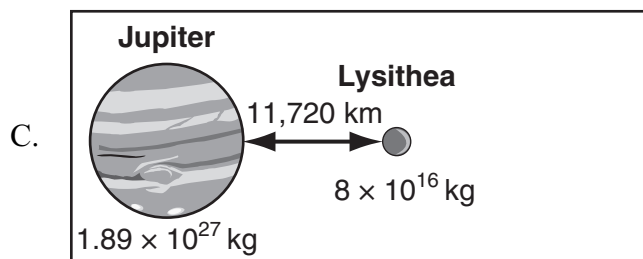
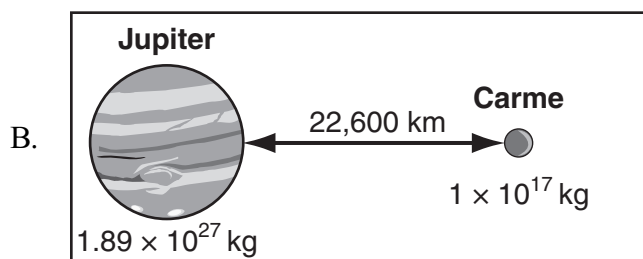
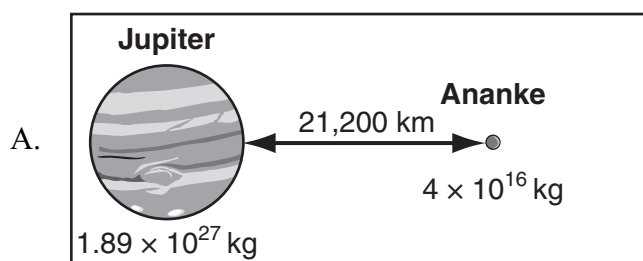
- A. The reaction is exothermic because the products have less energy than the reactants.
- B. The reaction is endothermic because the reactants have more energy than the products.
- C. The reaction is endothermic because the products have more energy than the reactants.
- D. The reaction is exothermic because the reactants have less energy than the products.

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PS3 (9–11) POC-9 Apply the concepts of inertia, motion, and momentum to predict and explain situations involving forces and motion, including stationary objects and collisions.

Please use the Formulas on the reference sheet to answer the question.

- 3** Which of Jupiter's moons experiences the **greatest** gravitational force of attraction to Jupiter?

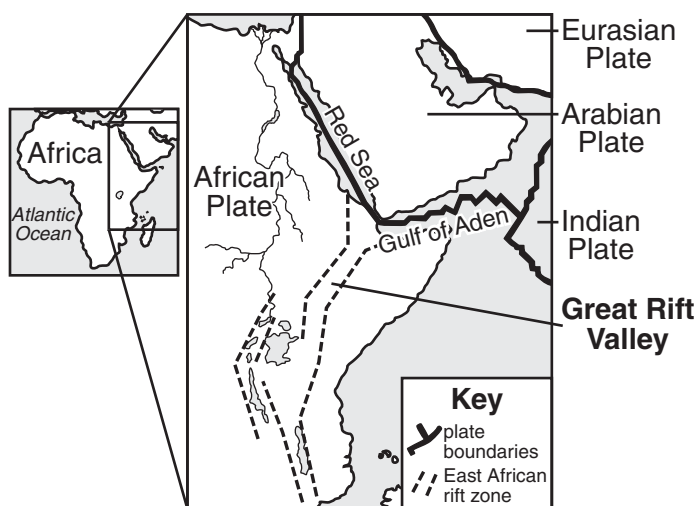


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ESS1 (9–11) POC-1 Provided with geologic data (including movement of plates) on a given locale, predict the likelihood for an Earth event (e.g., volcanoes, mountain ranges, islands, earthquakes, tides, tsunamis).

Please use the Plate Movements diagram on the reference sheet to answer the question.

- 4** The map below shows the location of the Great Rift Valley in East Africa.



The Great Rift Valley started forming millions of years ago. It slowly continues to deepen and widen, causing many volcanic eruptions and earthquakes in the area.

In a million years, what is the **most likely** geologic feature that will have formed where the Great Rift Valley is now located?

- A. an inland sea
- B. a mountain range
- C. a new continent
- D. a new forest

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ESS1 (9–11) POC-4 Relate how geologic time is determined using various dating methods (e.g., radioactive decay, rock sequences, fossil records).

- 5** A rock sample contains 80 g of a potassium-40 (K_{19}^{40}) isotope with a half-life of 1.25 billion years.

How much of the potassium-40 isotope will remain after 2.5 billion years have passed?

- A. 0 g
- B. 10 g
- C. 20 g
- D. 80 g

ESS3 (9–11) NOS-8 Explain the relationships between or among the energy produced from nuclear reactions, the origin of elements, and the life cycles of stars.

- 6** In 1987, a supernova was visible from the Southern Hemisphere. This was the first observation of a supernova in about 400 years.

Which statement does the observation **best** support?

- A. Atmospheric pollution is decreasing.
- B. Stars have a life cycle.
- C. Telescopes are becoming more powerful.
- D. The universe is slowly expanding.

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LS2 (9–11) SAE-3 Using data from a specific ecosystem, explain relationships or make predictions about how environmental disturbance (human impact or natural events) affects the flow of energy or cycling of matter in an ecosystem.

- 7** The table below lists causes of stream changes in the Mud Creek Watershed in North Carolina.

Changes in the Mud Creek Watershed

Cause	Specific Sources
Sedimentation	<ul style="list-style-type: none">• Runoff from roads, lawns, fields• Solid surfaces:<ul style="list-style-type: none">- roads- driveways- parking lots- rooftops- sidewalks• Disturbances from construction sites• Livestock access to creek
Nonpoint source pollutants	<ul style="list-style-type: none">• Road runoff of salt, metals, oil• Nutrients like pet waste, leaky septic systems, fertilizers• Pesticides from lawns and gardens• Agricultural runoff
Bacteria (fecal coliform)	<ul style="list-style-type: none">• Runoff of pet waste, leaky septic systems• Livestock access to creek

Which action might help improve the condition of the streams?

- A. restricting fishing
- B. clear-cutting the forest
- C. limiting residential development
- D. adding livestock to the region

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LS2 (9–11) NOS-5 Explain or evaluate potential bias in how evidence is interpreted in reports concerning a particular environmental factor that impacts the biology of humans.

- 8** Tobacco companies argue that smoking is not directly related to lung cancer. People who smoke cigarettes have only a one-percent chance of getting lung cancer.

Which statement **best** contradicts this claim?

- A. Lung cancer caused by asbestos exposure is the same as lung cancer caused by smoking.
- B. Eighty-seven percent of lung cancer patients smoke cigarettes.
- C. Cigarette smoke contains more than 4000 cancer-causing substances.
- D. Exposure to radon gas is considered the second leading cause of lung cancer.

LS4 (9–11) SAE-10 Explain how the immune system, endocrine system, or nervous system works and draw conclusions about how systems interact to maintain homeostasis in the human body.

- 9** Research has led scientists to conclude that fevers help the human body fight infection by elevating body temperatures and causing parts of the immune system to work better.

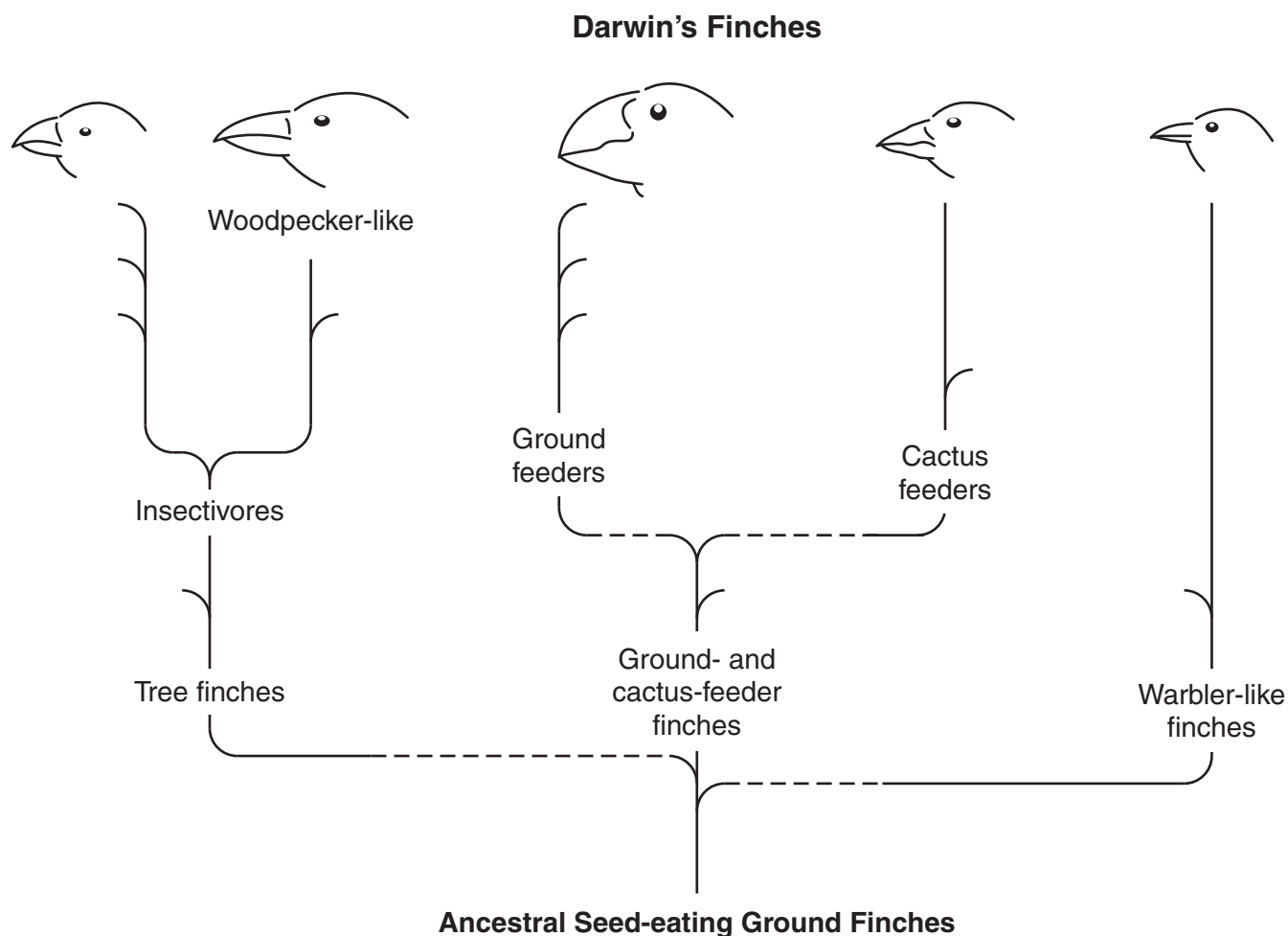
Which statement does this conclusion **best** support?

- A. Fevers are a disruption of homeostasis.
- B. Fevers should immediately be treated with medication.
- C. Fevers are a necessary part of maintaining homeostasis.
- D. Fevers are rarely caused by bacterial infections.

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LS3 (9–11) POC-8 Given information about living or extinct organisms, cite evidence to explain the frequency of inherited characteristics of organisms in a population, OR explain the evolution of varied structures (with defined functions) that affected the organisms' survival in a specific environment (e.g., giraffe, wind pollination of flowers).

- 10 The diagram below shows the evolutionary tree of the Galapagos Island finches.



The Galapagos Island finches evolved from seed-eating ground finches into many different species.

- a. Identify **two** factors that might have led to the variations of the ancestral seed-eating ground finches.

North American woodpeckers and Galapagos Island woodpecker finches have similar diets. North American woodpeckers have long tongues that allow them to extract insects that bore into trees. Galapagos Island woodpecker finches, which do not have long tongues, use cactus spines and twigs to extract insects from trees.

- b. Explain how North American woodpeckers and Galapagos Island woodpecker finches are able to occupy the same role.
- c. Explain how North American woodpeckers or Galapagos Island woodpecker finches might change over time if both birds shared the same ecosystem.

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Scoring Guide

Score	Description
4	Response demonstrates a thorough understanding of the evolution of varied structures that affected the organisms' survival in a specific environment. Response correctly identifies two factors that could lead to variations in the finches and explains the process of natural selection acting with the environment to determine beak length, explains why the woodpecker finch and the woodpecker hold the same niche, and describes changes that would occur in the lifestyle of the woodpeckers or woodpecker finches if they shared an ecosystem.
3	Response demonstrates a general understanding of the evolution of varied structures that affected the organisms' survival in a specific environment. The response is general.
2	Response demonstrates a limited understanding of the evolution of varied structures that affected the organisms' survival in a specific environment. The response is limited.
1	Response demonstrates a minimal understanding of the evolution of varied structures that affected the organisms' survival in a specific environment. The response is minimal.
0	Response is incorrect or contains work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

- a. Sample responses for thorough understanding:
Response should name **two** factors leading to variations.
- Genetic recombination—after fertilization, whatever combinations are in gametes (egg and sperm) combine and add to variations
 - **Mutation**—sudden change in genetic material
 - Mate selection—birds mate only with partners who are similar in structure
 - **Speciation**—some birds were isolated and mated only with birds in their environment that possessed common traits
 - The birds with the best suited bodies and beaks for the particular environment survive and pass along the successful adaptation from one generation to another through **natural selection**. Response should include information from diagram regarding beak size, type of food eaten, connection to ancestor, and habitat.
 - Geographic isolation caused the birds in remote areas to continue unique characteristics specific to that environment.
 - The lack of predators caused birds on one island to dominate the environment.
 - **Genetic drift**—birds moving into and out of the environment

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b. Sample responses for thorough understanding:

Use any one answer.

- Woodpecker finches were able to evolve into the same **niche** as woodpeckers because they have no competition for that particular niche. They have the ability to use and make tools that allows them to feed on insects in their environment. Had there been another bird in that niche the competition might have forced them into another lifestyle or they would have become extinct.
- Both birds are able to occupy the same role because they are in different environments.

c. Sample responses for thorough understanding:

Use any one answer.

- If both birds were to somehow reside in the same environment they would compete for the same diet. Since the woodpecker is better able to feed without the aid of a tool they would be able to feed faster, survive easier, and reproduce more offspring.
- The woodpecker finch would not find enough food to survive in the environment. If the woodpecker finch could not change to another niche it would become extinct.
- There might be a lack of predators for one of the birds that would cause that species to overpopulate that area.
- The bird more accustomed to the insects and plants in the environment would be the best fit and would survive.
- The bird new to the environment would be an invasive species and though it may become abundant by changing the environment, it could cause reduction in food for another species of animal, destroyed breeding places, the overgrowth of another unwelcome species, etc.

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SCORE POINT 4

10

- a) The finches may have all had different traits to start with. Slight differences in size of beak & size of body, legs ect. But depending on where on the island they lived they had different terrain & eating habits so birds with certain traits died off & left only similar types if they were distinctly different.
- b) They both peck at trees to get to their food with long slender beaks & they have it encoded in their minds to instinctively find a way to extract the insects. They have to different yet similar methods of getting their food.
- c) If the two had the same eco system, whomever had the trait that helped get the most food successfully would survive & the other would die off. If the northern woodpeckers with their tongues get more food then they'd most likely survive & if the gallapagos Island birds get more food with the cactus fishing then they'd survive.

The response demonstrates a thorough understanding. The response thoroughly describes two factors that could have led to genetic variations (different terrain, eating habits), and explains that the factors could have led to natural selection based on certain traits. The response clearly explains how the North American and Galapagos Island woodpeckers are able to occupy the same role. The response clearly explains how the birds might change over time if they occupied the same ecosystem.

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SCORE POINT 3

10

a. There might have been a shortage of food, so the finches had to find new ways to get food, such as from cacti. There also could have been a new predator and they would have to adopt new skills to survive.

b. They occupy the same role because circumstances led them to have to eat similar foods. They just do it independently.

c. If they were to live in the same ecosystem for a long period of time they would both have to change because there would be a shortage of food. They would both have to develop new ways of getting different food.

The response demonstrates a general understanding. The response generally describes two factors that could have led to genetic variations (food shortage, new predator). The response generally explains how the two woodpeckers are able to occupy the same role, but lacks specificity. The response explains that if the birds occupied the same ecosystem, they would both have to change, but doesn't explain how they might change.

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SCORE POINT 2

10

a. The seeds on the ground may have disappeared over a period of time so the finches would have too ~~elsewhere~~ for food. Also the environment probably changed making the finches adapt.

B. The North American woodpecker and the Galapagos Island woodpecker are able to occupy the same role because they both needed to adapt to their living environments.

C. If both birds shared the same ecosystem, the Galapagos Island woodpecker would have to change because in most of North America there are no cacti to help them get the insects out of the tree, making them adapt.

The response demonstrates a limited understanding. The response describes two factors that could have led to genetic variations (seeds disappeared for a while, environmental change), but doesn't explain how these factors could have led to the variations. The response gives an irrelevant explanation about how the two woodpeckers are able to occupy the same role. The response explains that if the Galapagos Island woodpeckers moved to North America, they would have to change to be able to find food, but doesn't explain how the Galapagos Island woodpeckers might change.

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SCORE POINT 1

10

- a. more accessibility to find seeds having a smaller beak would allow more precise feeding
- Easier to feed and go into small holes w/ beak
- b. They have similar anatomy
- c. They would change to accommodate their surroundings.

The response shows a minimal understanding. The response minimally responds to the prompt, but the answers are very vague.

SCORE POINT 0

10

- a) Tree and cactus finches
- b) Same shaped beak
- c) Their environment

The response does not demonstrate understanding of the prompt.

**NECAP 2009 RELEASED INQUIRY TASK
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Broad Area of Inquiry: Formulating Questions and Hypothesizing

Inquiry Construct 1: Analyze information from observations, research, or experimental data for the purpose of formulating a question, hypothesis, or prediction.

- 1** Form a hypothesis about the relationship between the magnitudes and frequency of earthquakes. Explain your thinking.

Scoring Guide

Score	Description
2	Response identifies a reasonable hypothesis and provides a clear explanation.
1	Response identifies a reasonable hypothesis without clear explanation or explanation without hypothesis.
0	Response does not contain any correct elements or is irrelevant.
Blank	No response

Training Notes:

The general relationship between the magnitude and frequency of earthquakes is that large magnitude earthquakes do not occur as frequently as small magnitude earthquakes. While this is the expected response, other hypotheses such as “there is no relationship between magnitude and frequency” are acceptable because the prediction does not have to be “correct” since the students have not done any experiments at this point. However, prediction should be reasonable and related to topic.

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SCORE POINT 2

1

I believe that the smaller the magnitude of an earthquake is, the higher the frequency will be. Smaller earthquakes do not require as much of a disturbance to occur so it is more likely that small earthquakes will happen than larger earthquakes.

The response gives a reasonable hypothesis (the smaller the magnitude the higher the frequency) and offers a logical reason for why the prediction was made.

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SCORE POINT 1

1

The lower the frequency the
higher the magnitude the
higher the frequency the
lower magnitude.

The response states a testable hypothesis with no rationale.

SCORE POINT 0

1

MY Hypothesis about the relationship
between the magnitudes and
frequency of earthquakes
IS they both help gather
information about an
earthquake & to test it

The response does not offer a testable hypothesis for the relationship between magnitude and frequency.

**NECAP 2009 RELEASED INQUIRY TASK
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Broad Area of Inquiry: Conducting Investigations

Inquiry Construct 8: Use accepted methods for organizing, representing, and manipulating data.

- 2 Construct the most appropriate type of graph of the data in Data Table 1 to show the relationship between the **magnitudes** and **frequencies** of earthquakes in Northern California and the Northeast. Make sure your graph includes all of the required elements.

Scoring Guide

Score	Description
3	Any errors do not detract from conveyance of meaning—response shows a thorough ability to construct a graph that conveys meaning.
2	Errors distract from conveyance of meaning—response shows a general ability to construct a graph that conveys meaning.
1	Errors interfere with conveyance of meaning—response shows a minimal ability to construct a graph that conveys meaning.
0	Response does not contain any correct elements or is irrelevant.
Blank	No response

Training Notes:

A bar graph, line graph, or scatter plot is the expected presentation.

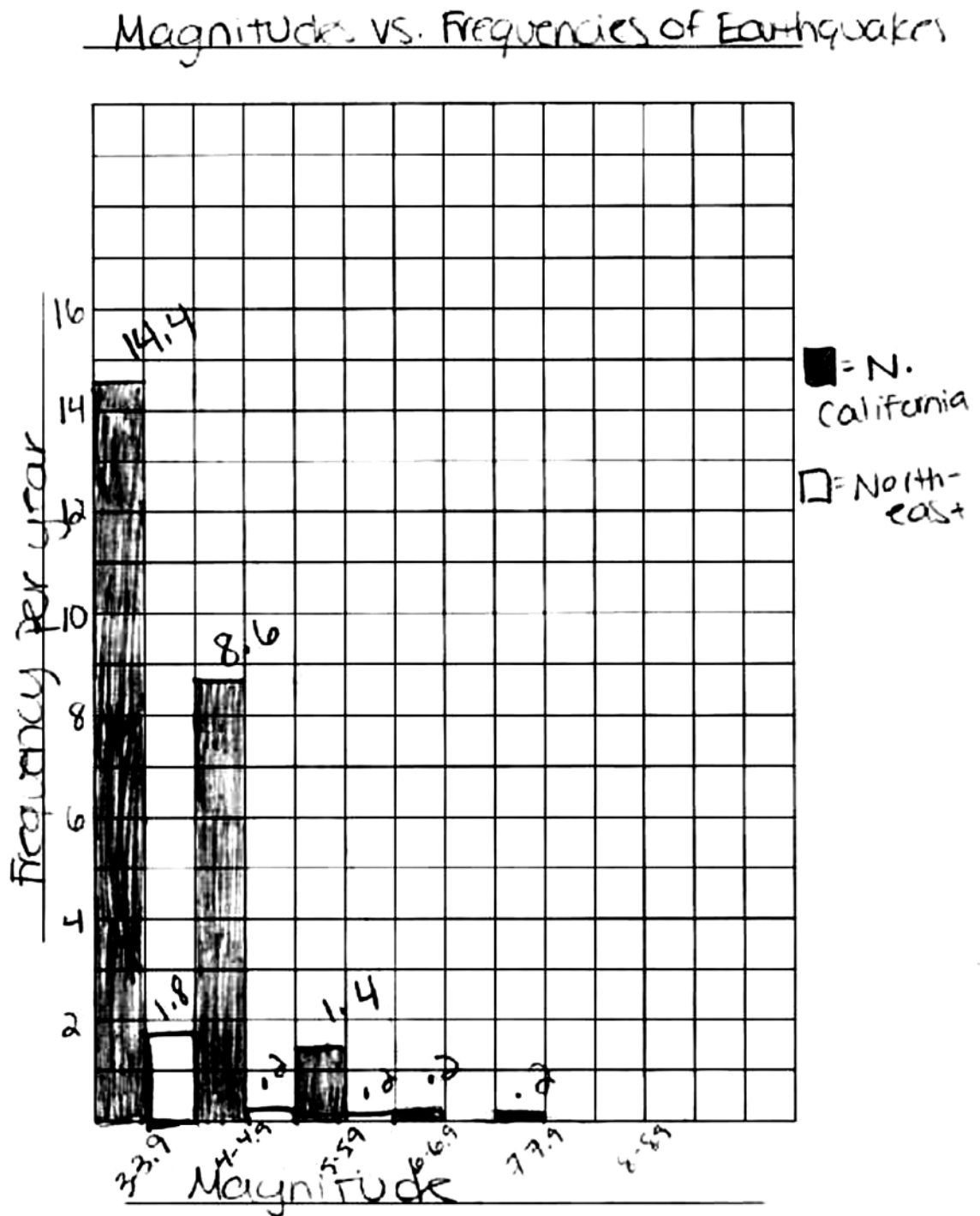
Magnitude should be plotted on the x-axis and Frequency on the y-axis.

If Numbers of Earthquakes are graphed or the axes are flipped, the highest score point is a 1.

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SCORE POINT 3

2

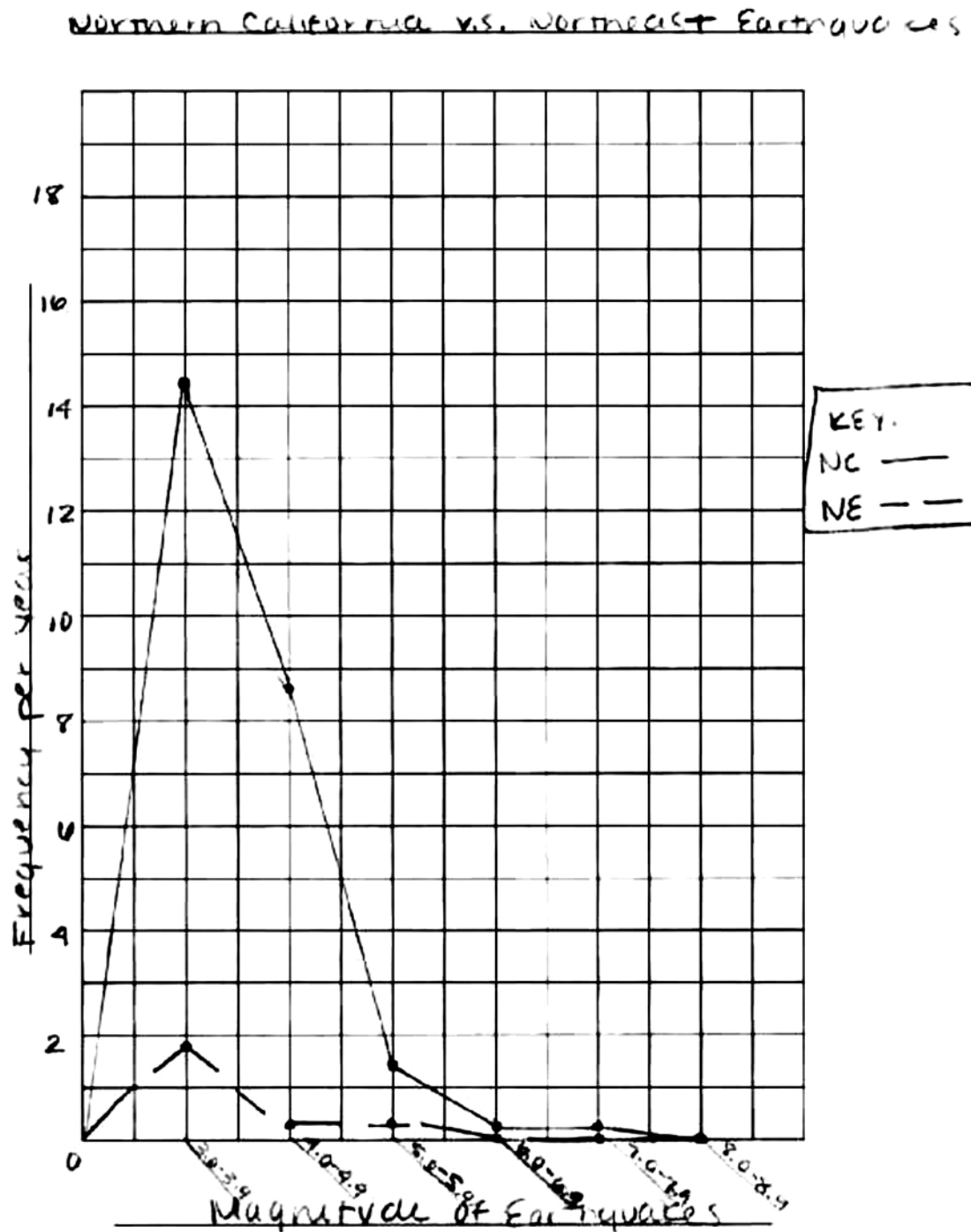


All data bars are the correct height, the scale is consistent and appropriate, both axes are labeled, there is a key to distinguish the data sets, and there is an appropriate title.

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SCORE POINT 2

2



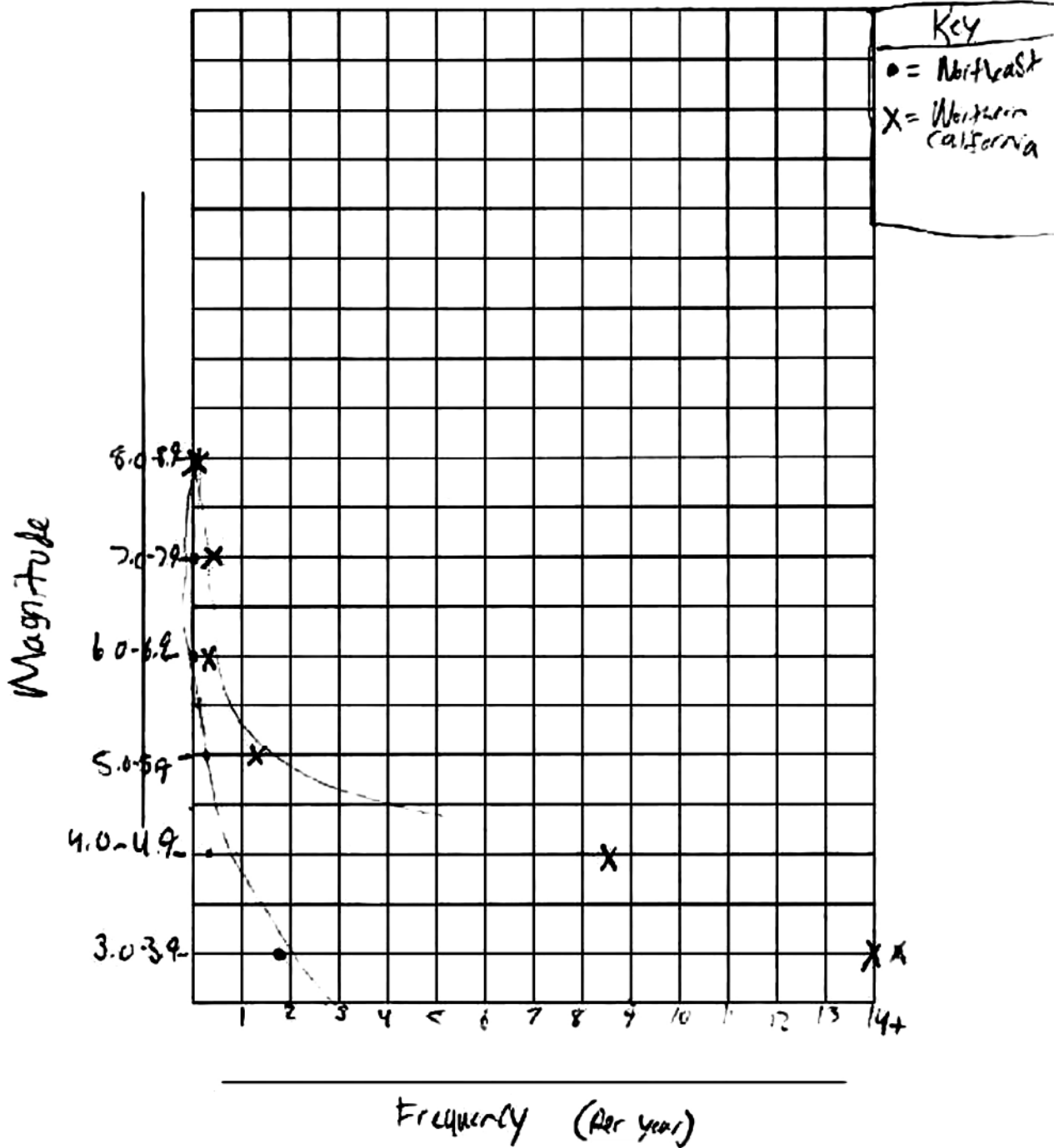
There are a few errors present, but the graph still gets its meaning across. Using (0, 0) as a data point is an error, and the title does not address the independent and dependent variables.

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SCORE POINT 1

2

Frequency of earthquakes in Northern California
and the North east



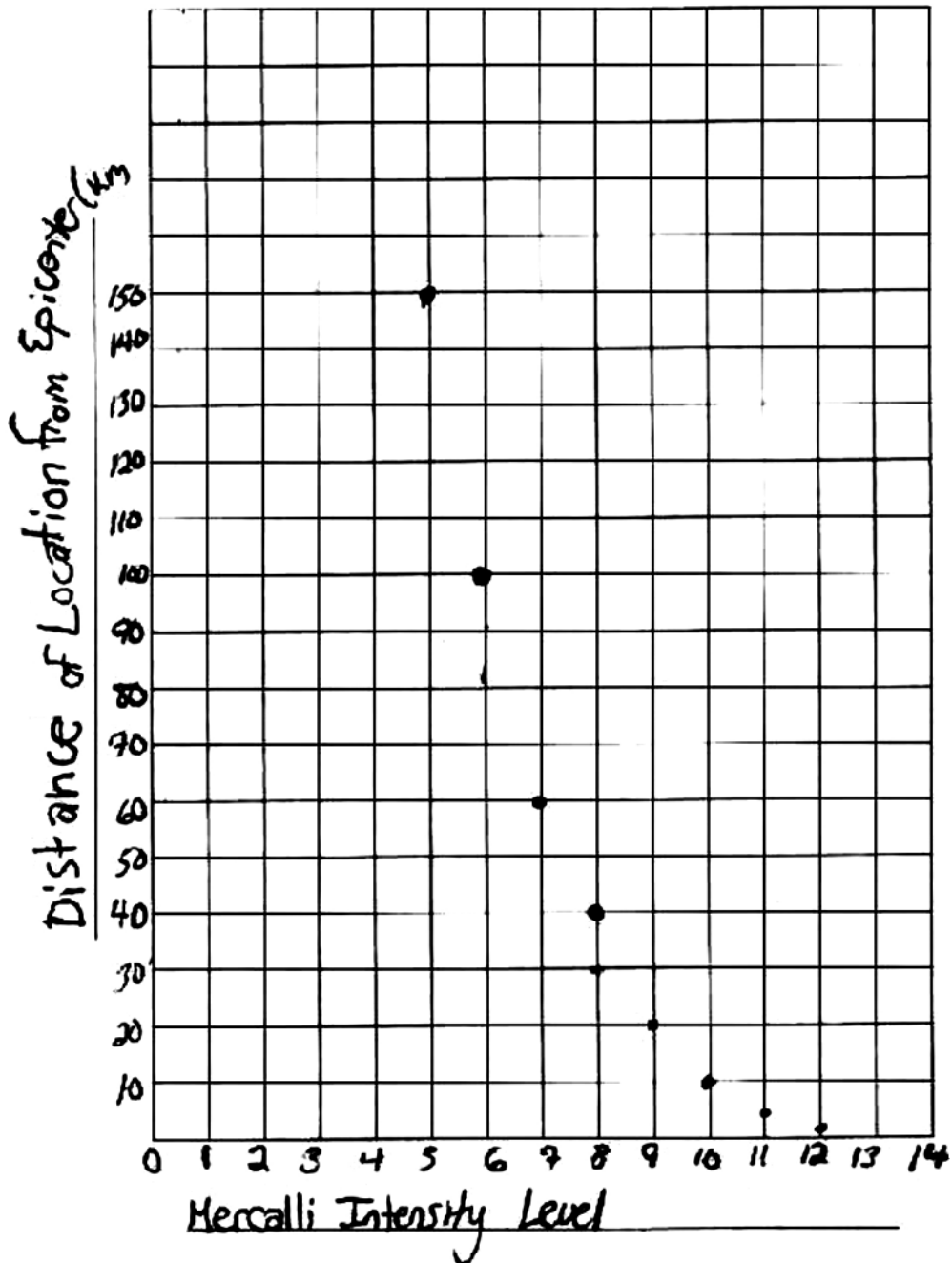
The graph is harder to understand, but there is still some correct work. The axes have been flipped, which is considered a major error (magnitude should be on the x-axis). The title does not address magnitude.

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SCORE POINT 0

2

1994 Northridge Earthquakes



The wrong data set has been graphed.

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Broad Area of Inquiry: Developing and Evaluating Explanations

Inquiry Construct 11: Analyze data, including determining if data are relevant, artifact, irrelevant, or anomalous.

- 3** How does the pattern in the data in Data Table 1 support or refute your hypothesis? Use evidence to explain your answer.

Scoring Guide

Score	Description
2	Response correctly evaluates whether hypothesis is supported or refuted and correctly uses specific evidence to support the answer.
1	Response correctly evaluates whether hypothesis is supported or refuted, or data is used correctly but without reference to hypothesis.
0	Response does not contain any correct elements or is irrelevant.
Blank	No response

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SCORE POINT 2

3

This graph supports my hypothesis. In my hypothesis I stated that as the magnitude increases the frequency decreases, which the graph shows. In northern California, they have had around 72 earthquakes, between 2002-2007, with a magnitude of 3.0-3.9. The Northeast has had 28 with a magnitude of 3.0-3.9. But when the magnitude increases to 4.0-4.9 in Northern California the number drops to 43 earthquakes. In the Northeast that number drops to 4 earthquakes.

The response takes a position (graph supports hypothesis) and gives specific evidence from the graph to support its claim.

1

Hypothesis → As the number of the measured earthquake (magnitude) increases, the frequency decreases.

Reason → My logic for this is the plates are constantly shifting so there will always be little earthquakes. Most of them aren't even felt because they are so small. The larger magnitude, the less common they are.

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SCORE POINT 1

3

The Data does not support my hypothesis because as the frequencies increase, the Magnitudes decrease.

The response takes a position (data does not support my hypothesis), and gives an unspecific statement about the graph.

1

The higher the frequency, the higher the magnitude of the Earthquakes. If a certain location gets many Earthquakes on a regular basis the magnitude will be higher. It would be higher because it is more susceptible¹⁵⁶⁷ to the Earthquakes happening.

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SCORE POINT 0

3

There are more earthquakes in California than the Northeast because Cali is on the edge of a tectonic plate.

The response is irrelevant to the prompt.

1

The frequency is how many earthquakes occur in an area each year at a given magnitude. The magnitude is the measure of an earthquake's size. They are both based off each other.

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Broad Area of Inquiry: Developing and Evaluating Explanations

Inquiry Construct 11: Analyze data, including determining if data are relevant, artifact, irrelevant, or anomalous.

- 4 Compare the data in Data Table 1 with the data in Data Table 2. Which data table would be **more** helpful to determine the possibility of an earthquake with a 5.5 magnitude occurring in Northern California and the Northeast? Use evidence to explain your reasoning.

Scoring Guide

Score	Description
2	Response correctly identifies Data Table 2 and explains reasoning.
1	Response correctly identifies Data Table 2 and does not clearly explain reasoning.
0	Response does not contain any correct elements or is irrelevant.
Blank	No response

Training Notes:

For example, the data in Table 2 would be the most helpful in determining the possibility of a M5.5 earthquake in either region. This is because the data in Table 2 covers a longer time period. A longer period provides a better overall look at the seismic activity in the region. The longer period provides more data, and the more data you have, the better your prediction can be. Also, if there was an anomalously low or high amount of earthquakes one year, this would greatly affect the data from 2002–2007 because it only covers 5 years. With 75 years of data, the anomalies would be averaged out.

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SCORE POINT 2

4

Data Table 2 would be more helpful because it gives a wider range of time where an earthquake could take place because Data Table 2 is of data from the years 1932 to 2007, while Data Table 1 is just from the years 2002 to 2007.

The response correctly identifies Data Table 2 and explains that the wider range of data makes it more helpful.

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SCORE POINT 1

4

Data table 2 - it is more precise.

The response correctly identifies Data Table 2, but the reasoning is very vague.

SCORE POINT 0

4

I think data table 1
would be more helpful because
it gives you more recent numbers

The response does not demonstrate an understanding of sample size.

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Broad Area of Inquiry: Developing and Evaluating Explanations

Inquiry Construct 11: Analyze data, including determining if data are relevant, artifact, irrelevant, or anomalous.

- 5 Use your observations of the pictures to rate the Loma Prieta earthquake's level of **intensity** on the Mercalli scale. Use evidence to explain your rating.

Scoring Guide

Score	Description
2	Identifies Level IX on the Mercalli scale and uses evidence from the Mercalli scale to explain observations.
1	Identifies Level IX on the Mercalli scale and may not use evidence from the Mercalli scale to explain observations.
0	Response does not contain any correct elements or is irrelevant.
Blank	No response

Training Notes:

The estimated Mercalli scale of intensity for the picture is IX because of the notable cracks in the ground and general damage to foundations. However, it is not a X, because the building's foundation is not completely destroyed.

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SCORE POINT 2

5

Intensity Level: IX

Explanation: I think this earthquake is at level IX because the foundation in the picture was cracked and the ground was split.

The response correctly identifies intensity Level IX and gives evidence from each picture that corresponds with the descriptions in the Mercalli scale.

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SCORE POINT 1

5

Intensity Level: IX

Explanation: Because The pictures show exactly what the scale describes with that intens of an earthquake

The response correctly identifies intensity Level IX, but does not use specific observations from the pictures for support.

SCORE POINT 0

5

Intensity Level: 4

Explanation:

huge crack in middle of street, houses cut in half.

The response does not identify the appropriate intensity level, and the observations do not correspond with the level given.

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Broad Area of Inquiry: Developing and Evaluating Explanations

Inquiry Construct 12: Use evidence to support and justify interpretations and conclusions or explain how the evidence refutes the hypothesis.

- 6** Use the evidence listed below to estimate how far Boulder Creek was from the epicenter of the 1989 Loma Prieta earthquake.

- Data Table
- the Mercalli scale
- the pictures of earthquake damage in Boulder Creek

Explain how you used **each** piece of evidence to estimate the distance.

Scoring Guide

Score	Description
2	Response correctly addresses all three points: 1. Observations of the damage in the pictures matched Level IX on the Mercalli scale. 2. According to the data in Table 3, Level IX damage occurs close to the epicenter. 3. The Boulder Creek area was 2 to 4 km from the epicenter of the earthquake.
1	Response generally addresses some of the points.
0	Response does not contain any correct elements or is irrelevant.
Blank	No response

Training Notes:

The estimated Mercalli scale of intensity for the picture is IX because of the notable cracks in the ground and general damage to foundations. Based on Data Table 3, intensity IX ends between 2 and 4 km from the epicenter.

If the response incorrectly identifies the Mercalli grade as VIII, and uses Table 3 to conclude that Boulder Creek is 10–20 km from the epicenter, it would get 2 points.

If the response incorrectly identifies the Mercalli grade as X, it must identify the distance as **less than** 2 km to earn 2 points.

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GRADE 11 SCIENCE

SCORE POINT 2

6

The data table shows that the Mercalli Intensity level IX would have to be 2-4 km away from the epicenter. The Mercalli Scale also says that a IX earthquake causes severe foundation damage and large cracks in the ground. The pictures show ruined foundations and cracks in the ground. Boulder Creek was 2-4 km away from the epicenter.

The response correctly identifies the distance from the epicenter. The procedure that was used to find the distance is clearly outlined.

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GRADE 11 SCIENCE

SCORE POINT 1

6

the distance from the
epicenter of the 1989 Loma
Prieta earthquake is about
2 km. away because it was
an intensity level of IX.

The response correctly identifies the lower bound of the distance (2 km), but does not identify the upper bound (4 km). The procedure for finding the distance is also explained poorly.

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SCORE POINT 0

6

I think it was within 100 miles
because there was a lot of damage. The
pictures help to tell me how much damage
there was and the scales help me
to figure out what magnitude the
earthquake could be.

The distance selected is incorrect, and it is unclear what procedure led to the incorrect distance.

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GRADE 11 SCIENCE**

Broad Area of Inquiry: Conducting Investigations

Inquiry Construct 10: Summarize results based on data.

Use the ShakeMap for the 2007 Oakland Earthquake on the Mercalli Scale and ShakeMap Reference Sheet to answer the question.

- 7** The ShakeMap for the 2007 Oakland earthquake identifies the cities of Oakland, Berkeley, Fremont, San Francisco, San Jose, and Vallejo in California. After the Oakland earthquake, the first emergency crews were dispatched to Oakland. To which city should the next emergency crews be sent? Explain your reasoning and use evidence to support your explanation.

Scoring Guide

Score	Description
2	Response indicates that emergency responders would be sent to Berkeley first. Response explains why they would go to Berkeley and uses evidence from the ShakeMap to support answer.
1	Response correctly identifies Berkeley with a limited explanation.
0	Response does not contain any correct elements or is irrelevant.
Blank	No response

Training Notes:

Simply saying that Berkeley is close is not acceptable for a 2. Response must relate distance to intensity.

If the response mentions the red fault lines as evidence for a high intensity level, the highest score is a 1 (e.g., Fremont).

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GRADE 11 SCIENCE

SCORE POINT 2

7

The next crew should be sent to Berkeley because
it is the closest to Oakland and the closer
the town is to the epicenter the worse the damage.

The response correctly identifies Berkeley as the next town, because it is the next closest town to the epicenter.

NECAP 2009 RELEASED INQUIRY TASK
GRADE 11 SCIENCE

SCORE POINT 1

7

The next city emergency crews should be sent is Berkeley because they would get second from the earthquake. Berkeley is closer than all the other cities.

The response correctly identifies Berkeley as the next town. "Berkeley is closer than all the other cities" is not a sufficient explanation without specifying that it is closer to the epicenter, not just closer to Oakland.

SCORE POINT 0

7

The emergency crew should be sent to Oakland because they were the first one.

Emergency crews are already in Oakland.

**NECAP 2009 RELEASED INQUIRY TASK
GRADE 11 SCIENCE**

Broad Area of Inquiry: Developing and Evaluating Explanations

Inquiry Construct 12: Use evidence to support and justify interpretations and conclusions or explain how the evidence refutes the hypothesis.

Use the ShakeMap for the 2007 Oakland Earthquake on the Mercalli Scale and ShakeMap Reference Sheet to answer the question.

- 8** Explain the factors that cause differences between earthquakes in Northern California and the Northeast. Use the information provided in this task and what you know about plate tectonics to support your answer.

Scoring Guide

Score	Description
3	The response thoroughly explains factors that cause differences between earthquakes in Northern California and the Northeast. The response uses information from the task and outside knowledge of plate tectonics for support.
2	The response generally explains factors that cause differences between earthquakes in Northern California and the Northeast. The response uses some information from the task and outside knowledge of plate tectonics for support.
1	The response minimally explains factors that cause earthquakes in Northern California or the Northeast. The response may or may not use information from the task and outside knowledge of plate tectonics for support.
0	Response does not contain any correct elements or is irrelevant.
Blank	No response

Training Notes:

Differences between the earthquakes observed in Northern California and in the Northeast:

- The boundary between the Pacific Plate and the North American Plate goes right through California. Earthquakes are caused by motion along plate boundaries, so it would be expected that there are a lot of earthquakes in California and that these earthquakes are larger than those occurring in the Northeast.
- The Northeast is in the middle of the North American Plate, nowhere near a plate boundary. Earthquakes in the Northeast are few and far between, and when they do happen they are relatively small.

For a 3, response must address location on the plates (edges vs. center) rather than just plates.

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GRADE 11 SCIENCE

SCORE POINT 3

8

The earthquakes are different in Northern Cali than in the Northeast because of the plate boundaries. Northern Cali is located on a plate boundary which makes it more prone to earthquakes caused by collision of plates. The Northeast is not very close to any plate boundaries so earthquakes are less common and with lower magnitudes.

The response discusses both locations and their proximity to plate boundaries. The response also states that earthquakes are caused by the collision of plates, which makes areas closer to boundaries more susceptible to earthquakes.

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SCORE POINT 2

8

The plates are running sideways in the west coast, causing a lot of earthquakes and they are right on the coast while the plates in the east are farther away (they are in the middle of the ocean)

The response generally describes plate motion and the location with respect to plates. The response doesn't mention anything about plate boundaries.

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GRADE 11 SCIENCE

SCORE POINT 1

8

I think that California has more intense earthquakes more frequently because it is on the coast, almost directly on a plate boundary.

The response mentions that being on a plate boundary would cause more frequent earthquakes, but doesn't mention why. The response also doesn't discuss the Northeast at any point.

SCORE POINT 0

8

Northern California has a more high altitude than Northeast does.

The response does not demonstrate understanding. Altitude does not play a significant role in this interaction.